 

In the Claims:

1. (Original) A MEMS variable optical attenuator device, comprising:

a substrate having formed therein means for securing at least one optical waveguide;

at least one optical waveguide, each having a gap between segments thereof, wherein said gap is formed once said at least one optical waveguide is secured by said securing means, thereby to insure optical alignment between said optical waveguide segments;

shutter means mounted proximate said gap formed in said at least one optical waveguide, said shutter means being movable inside said gap, in a dynamically variable amount as required, so as to block controllably a portion of the power of an optical signal propagating in said gap, between said optical waveguide segments; and

shutter actuation means to move said shutter means controllably and dynamically to any required position within said gap.

2. (Original) The device of claim 1, wherein said at least one optical waveguide is an optical fiber.

3. (Original) The device of claim 1, wherein said at least one optical waveguide is a polarization maintaining optical waveguide.

4. (Original) The device of claim 1, wherein said at least one optical waveguide is a polarization maintaining optical fiber.

5. (Original) The device of claim 1, wherein said securing means comprises a groove formed in said substrate.

6. (Original) The device of claim 1, wherein said gap is formed so as to have featured cross-section and geometrical form, designed to accommodate a specific geometrical shape of said shutter means.

7. (Original) The device of claim 1, wherein said shutter means is capable of moving in a direction which is not parallel to the plane of said substrate, on which said at least one optical waveguide is secured.

8. (Original) The device of claim 1, wherein said shutter actuation means comprises a flexible cantilever on which said shutter means is mounted, said flexible cantilever being actuated by an associated electrostatic electrode, by applying voltage between said flexible cantilever and said electrostatic electrode.

9. (Original) The device of claim 1, wherein said shutter actuation means is operable by at least one force selected from the group of forces including electrostatic force, magnetic force, thermal expansion force, and pneumatic force.

10. (Original) The device of claim 8, wherein said flexible cantilever is fabricated with holes.

11. (Original) The device of claim 1, assembled by vertical integration.

12. (Original) The device of claim 1, assembled by self-aligned vertical integration.

13. (Original) The device of claim 1, further including integrated optical power monitoring means for control of the optical power in at least one of said segments of said at least one optical waveguide.

14. (Original) The device of claim 1, further including electronic means for providing automatic control of said shutter actuation means, for controllably and dynamically moving said shutter means to any required position within said gap.

15. (Original) The device of claim 1, further including index matching fluid, filling said gap formed in said at least one optical waveguide.

16. (Original) The device of claim 1 comprising a plurality of optical waveguides and a corresponding plurality of gaps, associated shutter means and associated shutter actuation means, wherein each of said plurality of shutter actuation means is operable independently.

17. (Original) A method for assembling a MEMS variable optical attenuator device, comprising the steps of:

providing a substrate having formed therein means for securing at least one optical waveguide;

providing at least one optical waveguide and securing it on said substrate;

forming a gap in said at least one optical waveguide once it is secured by said securing means, so as to form two

optical waveguide segments, thereby insuring optical alignment between said optical waveguide segments;

mounting shutter means proximate said gap formed in said at least one optical waveguide, said shutter means being movable inside said gap, in a dynamically variable amount as required, so as to block controllably a portion of the power of an optical signal propagating in said gap, between said optical waveguide segments; and

providing shutter actuation means to move said shutter means controllably and dynamically to any required position within said gap.

18. (Original) The method of claim 17 wherein said gap forming step is performed by dicing.

19. (Original) The method of claim 17 wherein said gap forming step is performed by etching.

20. (Original) The method of claim 17 wherein said gap forming step is performed by laser cutting.

21. (Canceled).

22. (Canceled).